

## CLAIMS

1    1.    A magnetic head including a read head element, comprising:  
2           a pinned magnetic layer;  
3           a free magnetic layer having a central portion thereof having a free magnetization  
4    therewithin;  
5           a magnetic bias layer, including a central portion thereof that is disposed across said  
6    central portion of said free magnetic layer;  
7           said central portion of said bias layer being comprised of a material having an  
8    approximately zero magnetic moment;  
9           a barrier layer being disposed across said central portion of said bias layer.

1    2.    A magnetic head as described in claim 1 wherein said central portion of said bias layer is  
2    comprised of an oxidized material, and said barrier layer is comprised of a material that is a  
3    barrier to oxygen diffusion from said central portion of said bias layer.

1    3.    A magnetic head as described in claim 2, further including a thin spacer layer that is  
2    disposed upon said free magnetic layer, wherein said bias layer is disposed upon said thin spacer  
3    layer and said barrier layer is disposed upon said bias layer.

1    4.    A magnetic head as described in claim 3 wherein said barrier layer is comprised of a  
2    material that has low electrical conductivity.

1    5.    A magnetic head as described in claim 4 wherein said barrier layer is comprised of Ru or  
2    Rh.

1 6. A magnetic head as described in claim 5 wherein said barrier layer is comprised of Ru  
2 having a thickness of from approximately 5 Å to approximately 40 Å.

1 7. A magnetic head as described in claim 6 wherein said barrier layer has a thickness of  
2 approximately 20 Å.

1 8. A magnetic head as described in claim 3 wherein said thin spacer layer is comprised of a  
2 material that is a barrier to oxygen diffusion.

1 9. A magnetic head as described in claim 8 wherein said thin spacer layer is comprised of  
2 Ru.

1 10. A hard disk drive including a magnetic head including a read head element, comprising:  
2 a pinned magnetic layer;  
3 a free magnetic layer having a central portion thereof having a free magnetization  
4 therewithin;  
5 a magnetic bias layer, including a central portion thereof that is disposed across said  
6 central portion of said free magnetic layer;  
7 said central portion of said bias layer being comprised of a material having an  
8 approximately zero magnetic moment;  
9 a barrier layer being disposed across said central portion of said bias layer.

1 11. A magnetic head as described in claim 10 wherein said central portion of said bias layer  
2 is comprised of an oxidized material, and said barrier layer is comprised of a material that is a  
3 barrier to oxygen diffusion from said central portion of said bias layer.

1 12. A magnetic head as described in claim 11, further including a thin spacer layer that is  
2 disposed upon said free magnetic layer, wherein said bias layer is disposed upon said thin spacer  
3 layer and said barrier layer is deposited upon said bias layer.

1 13. A magnetic head as described in claim 12 wherein said barrier layer is comprised of a  
2 material that has low electrical conductivity.

1 14. A magnetic head as described in claim 13 wherein said barrier layer is comprised of Ru  
2 or Rh.

1 15. A magnetic head as described in claim 14 wherein said barrier layer is comprised of Ru  
2 having a thickness of from approximately 5 Å to approximately 40 Å.

1 16. A magnetic head as described in claim 15 wherein said barrier layer has a thickness of  
2 approximately 20 Å.

1 17. A magnetic head as described in claim 12 wherein said thin spacer layer is comprised of a  
2 material that is a barrier to oxygen diffusion.

1 18. A magnetic head as described in claim 17 wherein said thin spacer layer is comprised of  
2 Ru.

1 19. A method for fabricating a magnetic head, comprising:  
2 fabricating a free magnetic layer;  
3 fabricating a magnetic bias layer across said free magnetic layer;  
4 oxidizing a central portion of said bias layer;  
5 depositing an oxygen diffusion barrier layer upon said oxidized central portion of said  
6 bias layer.

1 20 A method for fabricating a magnetic head as described in claim 19 wherein said barrier  
2 layer is comprised of Ru or Rh.

1 21. A method for fabricating a magnetic head as described in claim 20 wherein said barrier  
2 layer is comprised of Ru and has a thickness of from approximately 5 Å to approximately 40 Å.

1 22. A method for fabricating a magnetic head as described in claim 21 wherein said barrier  
2 layer is formed with a thickness of approximately 20 Å.